

Work Order ID **94001**

November-29-12 9:50:31 AM

**\*94001\***

Page 1

Item ID: D412-664-203TRN

Accept

**\*N900040100\***

Setup Start **\*NS1\***

Revision ID:

Stop **\*NS2\***

Item Name: Crosstube Turning Detail

Start Date: 29/11/2012 Start Qty: 1.00

**\*1\***

Cust Item ID:

Required Date: 13/12/2012 Req'd Qty: 1.00

**\*1\***

Customer:

Reference:

Approvals: Process Plan: *ML5*

Date: *12-11-29* Tooling:

Date:

Run Start **\*NR1\***

QC:

Date: SPC (Y/N):

Date:

Stop **\*NR2\***

| Sequence ID/<br>Work Center ID | Operation<br>Description | Set Up/<br>Run Hours | Tool ID | Tool # | Plan<br>Code | Accept<br>Qty | Reject<br>Qty | Reject<br>Number | Insp.<br>Stamp |
|--------------------------------|--------------------------|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|
|--------------------------------|--------------------------|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|

Draw Nbr

Revision Nbr

D412-664-243

Rev E(DEO)

100

0.00

**\*100\***

MORI SEIKI CNC LATHE LARGE

Mori Seiki

Memo

0.00

Mori Seiki CNC Lathe Large

1-Fill tube with sand & install plugs DT8534 on both ends as per Folio FA166

2-Turn first side as per Folio FA166

3- File transition lines smooth.

FOLIO REV: *AA*

DWG REV: *E*

*1* *Ø*

*mmL*  
*12/12/07*

110

QC1- Inspect dimensions to dimension sheet

0.00

**\*110\***

QC

Memo

0.00


Quality Control

*1* *Ø*

*mmL*  
*12/12/07*

NCR: Yes / No

## WORK ORDER NON-CONFORMANCE / UPDATE

DQA:  Date: \_\_\_\_\_

QA Closed: \_\_\_\_\_ Date: \_\_\_\_\_

|   |                                    |  |   |   |                          |  |                        |                     |  |  |   |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
|---|------------------------------------|--|---|---|--------------------------|--|------------------------|---------------------|--|--|---|------------------------------------|------------------------------------|------------------------------------|--------------------------------------|------------------------------------|------------------------------------|--|----------------------------------|--|------------------------------------|--|--------------------------------|------------------------------------|------------------------------------|-----------------------------------|--|
| Work Order: _____<br><br>Part No. _____<br><br>NCR No. _____  |                                    |  |   | <b>DISPOSITION</b><br><br>Rework <input type="checkbox"/><br>Scrap <input type="checkbox"/><br>Use-as-is <input type="checkbox"/><br>Work Order Update <input type="checkbox"/> |                          | <b>AGAINST DEPARTMENT/PROCESS</b><br><br><table style="width:100%; border: none;"> <tr> <td style="width: 25%;">Skid-tube <input type="checkbox"/></td> <td style="width: 25%;">Crosstube <input type="checkbox"/></td> <td style="width: 25%;">Water Jet <input type="checkbox"/></td> <td style="width: 25%;">Engineering <input type="checkbox"/></td> </tr> <tr> <td>Machining <input type="checkbox"/></td> <td>Small Fab <input type="checkbox"/></td> <td>Prod. Eng. Coord. <input type="checkbox"/></td> <td>Quality <input type="checkbox"/></td> </tr> <tr> <td>Thermoforming <input type="checkbox"/></td> <td>Finishing <input type="checkbox"/></td> <td>Rec/Store/Packaging <input type="checkbox"/></td> <td>Other <input type="checkbox"/></td> </tr> <tr> <td>Large Fab <input type="checkbox"/></td> <td>Composite <input type="checkbox"/></td> <td>Supplier <input type="checkbox"/></td> <td></td> </tr> </table> |                        |                     |  |  |   | Skid-tube <input type="checkbox"/> | Crosstube <input type="checkbox"/> | Water Jet <input type="checkbox"/> | Engineering <input type="checkbox"/> | Machining <input type="checkbox"/> | Small Fab <input type="checkbox"/> | Prod. Eng. Coord. <input type="checkbox"/> | Quality <input type="checkbox"/> | Thermoforming <input type="checkbox"/> | Finishing <input type="checkbox"/> | Rec/Store/Packaging <input type="checkbox"/> | Other <input type="checkbox"/> | Large Fab <input type="checkbox"/> | Composite <input type="checkbox"/> | Supplier <input type="checkbox"/> |  |
| Skid-tube <input type="checkbox"/>  | Crosstube <input type="checkbox"/> | Water Jet <input type="checkbox"/>           | Engineering <input type="checkbox"/>  |   |                          |  |                        |                     |  |  |   |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Machining <input type="checkbox"/>  | Small Fab <input type="checkbox"/> | Prod. Eng. Coord. <input type="checkbox"/>   | Quality <input type="checkbox"/>  |   |                          |  |                        |                     |  |  |   |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Thermoforming <input type="checkbox"/>  | Finishing <input type="checkbox"/> | Rec/Store/Packaging <input type="checkbox"/> | Other <input type="checkbox"/>  |   |                          |  |                        |                     |  |  |   |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Large Fab <input type="checkbox"/>  | Composite <input type="checkbox"/> | Supplier <input type="checkbox"/>            |   |   |                          |  |                        |                     |  |  |   |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| <b>Root Cause</b>   | <b>Date</b>                        | <b>Step</b>                                  | <b>Qty</b>  | <b>Description of work order update or Non-conformance</b>  | <b>Initial Chief Eng</b> | <b>Action Description</b>  | <b>Sign &amp; Date</b> | <b>Verification</b> | <b>QC Inspector</b>  |  |   |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Doc/Data <input type="checkbox"/>   |                                    |  |   |   |                          |  |                        |                     |  |  |   |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Equip/Tooling <input type="checkbox"/>  |                                    |  |   |   |                          |  |                        |                     |  |  |   |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Operator <input type="checkbox"/>   |                                    |  |   |   |                          |  |                        |                     |  |  |   |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Material <input type="checkbox"/>   |                                    |  |   |   |                          |  |                        |                     |  |  |   |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Setup <input type="checkbox"/>  |                                    |  |   |   |                          |  |                        |                     |  |  |   |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Other <input type="checkbox"/>  |                                    |  |   |   |                          |  |                        |                     |  |  |   |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Process <input type="checkbox"/>  |                                    |  |   |   |                          |  |                        |                     |  |  |   |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Supplier <input type="checkbox"/>   |                                    |  |   |   |                          |  |                        |                     |  |  |   |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Training <input type="checkbox"/>   |                                    |  |   |   |                          |  |                        |                     |  |  |   |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Unapproved <input type="checkbox"/>   |                                    |  |   |   |                          |  |                        |                     |  |  |   |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| <b>FAULT CATEGORY</b>   |                                    |  |   |   |                          |  |                        |                     |  |  |   |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| <b>Landing Gear</b><br><input type="checkbox"/> Bending<br><input type="checkbox"/> Centre Not Concentric to O/S<br><input type="checkbox"/> Cracks<br><input type="checkbox"/> Crushed/Crimped<br><input type="checkbox"/> Cuffs<br><input type="checkbox"/> Heat Treat<br><input type="checkbox"/> Inspection Strip in Tube<br><input type="checkbox"/> Ripples in Bend<br><input type="checkbox"/> Torque Waves in Extrusion<br><input type="checkbox"/> Turning Sequence<br><input type="checkbox"/> Wave/Twist in Tube |                                    |  | <b>General</b><br><input type="checkbox"/> Bend<br><input type="checkbox"/> BOM/Route<br><input type="checkbox"/> Broken/Damaged<br><input type="checkbox"/> Burrs<br><input type="checkbox"/> Contamination<br><input type="checkbox"/> Countersink<br><input type="checkbox"/> Cut Too Short<br><input type="checkbox"/> Drill Holes<br><input type="checkbox"/> Drawing<br><input type="checkbox"/> Finish<br><input type="checkbox"/> Folio |   |                          | <input type="checkbox"/> Grain<br><input type="checkbox"/> Hardware<br><input type="checkbox"/> Inspection Incomplete<br><input type="checkbox"/> Instructions Incomplete/Unclear<br><input type="checkbox"/> Maintenance<br><input type="checkbox"/> Mislabeled<br><input type="checkbox"/> Misread<br><input type="checkbox"/> Offset<br><input type="checkbox"/> Out of Calibration<br><input type="checkbox"/> Out of Sequence<br><input type="checkbox"/> Outside Dimensions  |                        |                     | <input type="checkbox"/> Ovalized<br><input type="checkbox"/> Over/Under tolerance<br><input type="checkbox"/> Part Incorrect<br><input type="checkbox"/> Part Lost/Missing<br><input type="checkbox"/> Part Moved<br><input type="checkbox"/> Positioned Wrong<br><input type="checkbox"/> Power Loss/Surge |  | <input type="checkbox"/> Pressure/Forced<br><input type="checkbox"/> Temperature/Cure<br><input type="checkbox"/> Weld<br><input type="checkbox"/> Wrong Stock Pulled<br><br><input type="checkbox"/> Other |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |

November-29-12 9:50:31 AM

Page 2

**Accept**

Setup Start \*NS1\*

Stop **\*NS2\***

**Start Date:** 29/11/2012    **Start Qty:** 1.00    **\*1\***

**Cust Item ID:**

**Required Date:** 13/12/2012      **Req'd Qty:** 1.00      **\* 1 \***

**Customer:**

**Reference:**

**Approvals:** \_\_\_\_\_ **Process Plan:** \_\_\_\_\_ **Date:** \_\_\_\_\_ **Tooling:** \_\_\_\_\_ **Date:** \_\_\_\_\_

Run Start \*NR1\*

QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Stop \*NR2\*

| Sequence ID/<br>Work Center ID | Operation<br>Description | Set Up/<br>Run Hours | Tool ID | Tool # | Plan<br>Code | Accept<br>Qty | Reject<br>Qty | Reject<br>Number | Insp.<br>Stamp |
|--------------------------------|--------------------------|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|
|--------------------------------|--------------------------|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|

120

0.00

**\*120\***

MORI SEIKI CNC LATHE LARGE

Mori Seiki

## Memo

0.00

## Mori Seiki CNC Lathe Large

1-Turn second side as per Folio FA166  
2- File transition lines smooth.  
3- Remove sand and plugs  
4-Scribe part # and batch # using vibrating stylus  
FOLIO REV: 4A  
DWG REV: E

130

|  |      |
|--|------|
| QC1- Inspect dimensions to dimension sheet | 0.00 |
|--|------|

\*130\*

QC

## Memo

0.00

## Quality Control

+ PERFORM ULTRA SONIC MEASUREMENT

140

|                                   |      |
|-----------------------------------|------|
| QC8- Inspect parts - second check | 0.00 |
|-----------------------------------|------|

**\*140\***

QC

## Memo

0.00

## Quality Control

+ CHECK ULTRA SONIC MEASUREMENT AND ORIENTATION FOR BENDING

NCR: Yes / No

**WORK ORDER NON-CONFORMANCE / UPDATE**

DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA Closed: \_\_\_\_\_ Date: \_\_\_\_\_

|  |   |  |                                      |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
|--|---|--|--------------------------------------|------------------------------------|------------------------------------|--------------------------------------|------------------------------------|------------------------------------|--|----------------------------------|--|------------------------------------|--|--------------------------------|------------------------------------|------------------------------------|-----------------------------------|--|
| Work Order: _____<br><br>Part No. _____<br><br>NCR No. _____ | <b>DISPOSITION</b><br><br>Rework <input type="checkbox"/><br>Scrap <input type="checkbox"/><br>Use-as-is <input type="checkbox"/><br>Work Order Update <input type="checkbox"/> | <b>AGAINST DEPARTMENT/PROCESS</b><br><br><table style="width:100%;"> <tr> <td>Skid-tube <input type="checkbox"/></td> <td>Crosstube <input type="checkbox"/></td> <td>Water Jet <input type="checkbox"/></td> <td>Engineering <input type="checkbox"/></td> </tr> <tr> <td>Machining <input type="checkbox"/></td> <td>Small Fab <input type="checkbox"/></td> <td>Prod. Eng. Coord. <input type="checkbox"/></td> <td>Quality <input type="checkbox"/></td> </tr> <tr> <td>Thermoforming <input type="checkbox"/></td> <td>Finishing <input type="checkbox"/></td> <td>Rec/Store/Packaging <input type="checkbox"/></td> <td>Other <input type="checkbox"/></td> </tr> <tr> <td>Large Fab <input type="checkbox"/></td> <td>Composite <input type="checkbox"/></td> <td>Supplier <input type="checkbox"/></td> <td></td> </tr> </table> | Skid-tube <input type="checkbox"/>   | Crosstube <input type="checkbox"/> | Water Jet <input type="checkbox"/> | Engineering <input type="checkbox"/> | Machining <input type="checkbox"/> | Small Fab <input type="checkbox"/> | Prod. Eng. Coord. <input type="checkbox"/> | Quality <input type="checkbox"/> | Thermoforming <input type="checkbox"/> | Finishing <input type="checkbox"/> | Rec/Store/Packaging <input type="checkbox"/> | Other <input type="checkbox"/> | Large Fab <input type="checkbox"/> | Composite <input type="checkbox"/> | Supplier <input type="checkbox"/> |  |
| Skid-tube <input type="checkbox"/>                           | Crosstube <input type="checkbox"/>  | Water Jet <input type="checkbox"/>   | Engineering <input type="checkbox"/> |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Machining <input type="checkbox"/>                           | Small Fab <input type="checkbox"/>  | Prod. Eng. Coord. <input type="checkbox"/>   | Quality <input type="checkbox"/>     |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Thermoforming <input type="checkbox"/>                       | Finishing <input type="checkbox"/>  | Rec/Store/Packaging <input type="checkbox"/>   | Other <input type="checkbox"/>       |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Large Fab <input type="checkbox"/>                           | Composite <input type="checkbox"/>  | Supplier <input type="checkbox"/>  |                                      |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |

| Root Cause    | Date | Step | Qty | Description of work order update or Non-conformance | Initial Chief Eng | Action Description | Sign & Date | Verification | QC Inspector |
|---------------|------|------|-----|---|-------------------|--------------------|-------------|--------------|--------------|
| Doc/Data      |      |      |     |   |                   |                    |             |              |              |
| Equip/Tooling |      |      |     |   |                   |                    |             |              |              |
| Operator      |      |      |     |   |                   |                    |             |              |              |
| Material      |      |      |     |   |                   |                    |             |              |              |
| Setup         |      |      |     |   |                   |                    |             |              |              |
| Other         |      |      |     |   |                   |                    |             |              |              |
| Process       |      |      |     |   |                   |                    |             |              |              |
| Supplier      |      |      |     |   |                   |                    |             |              |              |
| Training      |      |      |     |   |                   |                    |             |              |              |
| Unapproved    |      |      |     |   |                   |                    |             |              |              |

**FAULT CATEGORY**

| Landing Gear  | General                                 | Other  |
|---|---|--|
| <input type="checkbox"/> Bending                      | <input type="checkbox"/> Bend           | <input type="checkbox"/> Grain                           |
| <input type="checkbox"/> Centre Not Concentric to O/S | <input type="checkbox"/> BOM/Route      | <input type="checkbox"/> Hardware                        |
| <input type="checkbox"/> Cracks                       | <input type="checkbox"/> Broken/Damaged | <input type="checkbox"/> Inspection Incomplete           |
| <input type="checkbox"/> Crushed/Crimped              | <input type="checkbox"/> Burrs          | <input type="checkbox"/> Instructions Incomplete/Unclear |
| <input type="checkbox"/> Cuffs                        | <input type="checkbox"/> Contamination  | <input type="checkbox"/> Maintenance                     |
| <input type="checkbox"/> Heat Treat                   | <input type="checkbox"/> Countersink    | <input type="checkbox"/> Mislabeled                      |
| <input type="checkbox"/> Inspection Strip in Tube     | <input type="checkbox"/> Cut Too Short  | <input type="checkbox"/> Misread                         |
| <input type="checkbox"/> Ripples in Bend              | <input type="checkbox"/> Drill Holes    | <input type="checkbox"/> Offset                          |
| <input type="checkbox"/> Torque Waves in Extrusion    | <input type="checkbox"/> Drawing        | <input type="checkbox"/> Out of Calibration              |
| <input type="checkbox"/> Turning Sequence             | <input type="checkbox"/> Finish         | <input type="checkbox"/> Out of Sequence                 |
| <input type="checkbox"/> Wave/Twist in Tube           | <input type="checkbox"/> Folio          | <input type="checkbox"/> Outside Dimensions              |
|   |   | <input type="checkbox"/> Ovalized                        |
|   |   | <input type="checkbox"/> Over/Under tolerance            |
|   |   | <input type="checkbox"/> Part Incorrect                  |
|   |   | <input type="checkbox"/> Part Lost/Missing               |
|   |   | <input type="checkbox"/> Part Moved                      |
|   |   | <input type="checkbox"/> Positioned Wrong                |
|   |   | <input type="checkbox"/> Power Loss/Surge                |
|   |   | <input type="checkbox"/> Pressure/Forced                 |
|   |   | <input type="checkbox"/> Temperature/Cure                |
|   |   | <input type="checkbox"/> Weld                            |
|   |   | <input type="checkbox"/> Wrong Stock Pulled              |
|   |   | <input type="checkbox"/> Other                           |

# Work Order ID 94001

November-29-12 9:50:31 AM

\*94001\*

Page 3

Item ID: D412-664-203TRN

Accept

\*N900040100\*

Setup Start \*NS1\*

Revision ID:

Stop \*NS2\*

Item Name: Crosstube Turning Detail

Start Date: 29/11/2012 Start Qty: 1.00

\*1\*

Cust Item ID:

Required Date: 13/12/2012 Req'd Qty: 1.00

\*1\*

Customer:

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_ Run Start \*NR1\*  
QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_ Stop \*NR2\*

| Sequence ID/<br>Work Center ID | Operation<br>Description | Set Up/<br>Run Hours | Tool ID | Tool # | Plan<br>Code | Accept<br>Qty | Reject<br>Qty | Reject<br>Number | Insp.<br>Stamp |
|--------------------------------|--------------------------|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|
|--------------------------------|--------------------------|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|

|            |   |      |  |  |  |  |  |  |  |
|------------|---|------|--|--|--|--|--|--|--|
| 145        |   | 0.00 |  |  |  |  |  |  |  |
| *145*      |   |      |  |  |  |  |  |  |  |
| Crosstubes | Memo  | 0.00 |  |  |  |  |  |  |  |
| Crosstubes | GRIND ONLY TRANSITION LINES SMOOTH LONGITUDE WAY. |      |  |  |  |  |  |  |  |

RM 12-12-17

|                           |  |      |  |  |  |  |  |  |  |
|---------------------------|--|------|--|--|--|--|--|--|--|
| 150                       |  | 0.00 |  |  |  |  |  |  |  |
| *150*                     |  |      |  |  |  |  |  |  |  |
| HandFXtube                | Memo   | 0.00 |  |  |  |  |  |  |  |
| Hand Finishing Crosstubes | 1- PRESSURE WASH X-TUBE INSIDE AND OUT                   |      |  |  |  |  |  |  |  |
|                           | 2- ACID ETCH X-TUBE INSIDE AND OUT. USE RED SCOTCH BRITE |      |  |  |  |  |  |  |  |

MO / RM 12-12-17

|                 |   |      |  |  |  |  |  |  |  |
|-----------------|---|------|--|--|--|--|--|--|--|
| 160             | QC5- Inspect part completeness to step on W/O | 0.00 |  |  |  |  |  |  |  |
| *160*           |   |      |  |  |  |  |  |  |  |
| QC              | Memo  | 0.00 |  |  |  |  |  |  |  |
| Quality Control |   |      |  |  |  |  |  |  |  |

DA 12-12-17

NCR: Yes / No

**WORK ORDER NON-CONFORMANCE / UPDATE**

DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA Closed: \_\_\_\_\_ Date: \_\_\_\_\_

|  |             |             |   |   |                          |   |                        |                     |   |  |  |
|--|-------------|-------------|---|---|--------------------------|---|------------------------|---------------------|---|--|--|
| Work Order: _____<br><br>Part No. _____<br><br>NCR No. _____   |             |             |   | <b>DISPOSITION</b><br><br>Rework <input type="checkbox"/><br>Scrap <input type="checkbox"/><br>Use-as-is <input type="checkbox"/><br>Work Order Update <input type="checkbox"/> |                          | <b>AGAINST DEPARTMENT/PROCESS</b><br><br><div style="display: flex; justify-content: space-between;"> <div>           Skid-tube <input type="checkbox"/><br/>           Machining <input type="checkbox"/><br/>           Thermoforming <input type="checkbox"/><br/>           Large Fab <input type="checkbox"/> </div> <div>           Crosstube <input type="checkbox"/><br/>           Small Fab <input type="checkbox"/><br/>           Finishing <input type="checkbox"/><br/>           Composite <input type="checkbox"/> </div> <div>           Water Jet <input type="checkbox"/><br/>           Prod. Eng. Coord. <input type="checkbox"/><br/>           Rec/Store/Packaging <input type="checkbox"/><br/>           Supplier <input type="checkbox"/> </div> <div>           Engineering <input type="checkbox"/><br/>           Quality <input type="checkbox"/><br/>           Other <input type="checkbox"/> </div> </div> |                        |                     |   |  |  |
| <b>Root Cause</b>  | <b>Date</b> | <b>Step</b> | <b>Qty</b>  | <b>Description of work order update or Non-conformance</b>  | <b>Initial Chief Eng</b> | <b>Action Description</b>   | <b>Sign &amp; Date</b> | <b>Verification</b> | <b>QC Inspector</b>   |  |  |
| Doc/Data <input type="checkbox"/>  |             |             |   |   |                          |   |                        |                     |   |  |  |
| Equip/Tooling <input type="checkbox"/>   |             |             |   |   |                          |   |                        |                     |   |  |  |
| Operator <input type="checkbox"/>  |             |             |   |   |                          |   |                        |                     |   |  |  |
| Material <input type="checkbox"/>  |             |             |   |   |                          |   |                        |                     |   |  |  |
| Setup <input type="checkbox"/>   |             |             |   |   |                          |   |                        |                     |   |  |  |
| Other <input type="checkbox"/>   |             |             |   |   |                          |   |                        |                     |   |  |  |
| Process <input type="checkbox"/>   |             |             |   |   |                          |   |                        |                     |   |  |  |
| Supplier <input type="checkbox"/>  |             |             |   |   |                          |   |                        |                     |   |  |  |
| Training <input type="checkbox"/>  |             |             |   |   |                          |   |                        |                     |   |  |  |
| Unapproved <input type="checkbox"/>  |             |             |   |   |                          |   |                        |                     |   |  |  |
| <b>FAULT CATEGORY</b>  |             |             |   |   |                          |   |                        |                     |   |  |  |
| <b>Landing Gear</b><br><input type="checkbox"/> Bending<br><input type="checkbox"/> Centre Not Concentric to O/S<br><input type="checkbox"/> Cracks<br><input type="checkbox"/> Crushed/Crimped.<br><input type="checkbox"/> Cuffs<br><input type="checkbox"/> Heat Treat<br><input type="checkbox"/> Inspection Strip in Tube<br><input type="checkbox"/> Ripples in Bend<br><input type="checkbox"/> Torque Waves in Extrusion<br><input type="checkbox"/> Turning Sequence<br><input type="checkbox"/> Wave/Twist in Tube |             |             | <b>General</b><br><input type="checkbox"/> Bend<br><input type="checkbox"/> BOM/Route<br><input type="checkbox"/> Broken/Damaged<br><input type="checkbox"/> Burrs<br><input type="checkbox"/> Contamination<br><input type="checkbox"/> Countersink<br><input type="checkbox"/> Cut Too Short<br><input type="checkbox"/> Drill Holes<br><input type="checkbox"/> Drawing<br><input type="checkbox"/> Finish<br><input type="checkbox"/> Folio |   |                          | <input type="checkbox"/> Grain<br><input type="checkbox"/> Hardware<br><input type="checkbox"/> Inspection Incomplete<br><input type="checkbox"/> Instructions Incomplete/Unclear<br><input type="checkbox"/> Maintenance<br><input type="checkbox"/> Mislabeled<br><input type="checkbox"/> Misread<br><input type="checkbox"/> Offset<br><input type="checkbox"/> Out of Calibration<br><input type="checkbox"/> Out of Sequence<br><input type="checkbox"/> Outside Dimensions   |                        |                     | <input type="checkbox"/> Ovalized<br><input type="checkbox"/> Over/Under tolerance<br><input type="checkbox"/> Part Incorrect<br><input type="checkbox"/> Part Lost/Missing<br><input type="checkbox"/> Part Moved<br><input type="checkbox"/> Positioned Wrong<br><input type="checkbox"/> Power Loss/Surge<br><br><input type="checkbox"/> Pressure/Forced<br><input type="checkbox"/> Temperature/Cure<br><input type="checkbox"/> Weld<br><input type="checkbox"/> Wrong Stock Pulled<br><br><input type="checkbox"/> Other |  |  |

# Work Order ID 94001

November-29-12 9:50:31 AM

\*94001\*

Page 4

Item ID: D412-664-203TRN

Accept

\*N900040100\*

Setup Start \*NS1\*

Revision ID:

Item Name: Crosstube Turning Detail

Stop \*NS2\*

Start Date: 29/11/2012 Start Qty: 1.00 \*1\*

Cust Item ID:

Required Date: 13/12/2012 Req'd Qty: 1.00 \*1\*

Customer:

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_ Run Start \*NR1\*  
QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_ Stop \*NR2\*

| Sequence ID/<br>Work Center ID | Operation<br>Description                                 | Set Up/<br>Run Hours | Tool ID | Tool # | Plan<br>Code | Accept<br>Qty | Reject<br>Qty | Reject<br>Number | Insp.<br>Stamp |
|--------------------------------|--|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|
| 170                            |  | 0.00                 |         |        |              |               |               |                  |                |
| <b>*170*</b>                   | Packaging  |                      |         |        |              |               |               |                  |                |
| Packaging                      | Memo   | 0.00                 |         |        |              |               |               |                  |                |
| Packaging                      | Identify and stock in kanban rack<br>Location: <u>LG</u> |                      |         |        |              |               |               |                  |                |
| 180                            |  |                      |         |        |              |               |               |                  |                |
| <b>*180*</b>                   | QC21- Final Inspection - Work Order Release              | 0.00                 |         |        |              |               |               |                  |                |
| QC                             | Memo   | 0.00                 |         |        |              |               |               |                  |                |
| Quality Control                |  |                      |         |        |              |               |               |                  |                |

MO 12/12/17

12/12/18

W 12/12/18

NCR: Yes / No

**WORK ORDER NON-CONFORMANCE / UPDATE**

DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA Closed: \_\_\_\_\_ Date: \_\_\_\_\_

|  |   |   |                                      |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
|--|---|---|--------------------------------------|------------------------------------|------------------------------------|--------------------------------------|------------------------------------|------------------------------------|--|----------------------------------|--|------------------------------------|--|--------------------------------|------------------------------------|------------------------------------|-----------------------------------|--|
| Work Order: _____<br><br>Part No. _____<br><br>NCR No. _____ | <b>DISPOSITION</b><br><br>Rework <input type="checkbox"/><br>Scrap <input type="checkbox"/><br>Use-as-is <input type="checkbox"/><br>Work Order Update <input type="checkbox"/> | <b>AGAINST DEPARTMENT/PROCESS</b><br><br><table style="width: 100%;"> <tr> <td>Skid-tube <input type="checkbox"/></td> <td>Crosstube <input type="checkbox"/></td> <td>Water Jet <input type="checkbox"/></td> <td>Engineering <input type="checkbox"/></td> </tr> <tr> <td>Machining <input type="checkbox"/></td> <td>Small Fab <input type="checkbox"/></td> <td>Prod. Eng. Coord. <input type="checkbox"/></td> <td>Quality <input type="checkbox"/></td> </tr> <tr> <td>Thermoforming <input type="checkbox"/></td> <td>Finishing <input type="checkbox"/></td> <td>Rec/Store/Packaging <input type="checkbox"/></td> <td>Other <input type="checkbox"/></td> </tr> <tr> <td>Large Fab <input type="checkbox"/></td> <td>Composite <input type="checkbox"/></td> <td>Supplier <input type="checkbox"/></td> <td></td> </tr> </table> | Skid-tube <input type="checkbox"/>   | Crosstube <input type="checkbox"/> | Water Jet <input type="checkbox"/> | Engineering <input type="checkbox"/> | Machining <input type="checkbox"/> | Small Fab <input type="checkbox"/> | Prod. Eng. Coord. <input type="checkbox"/> | Quality <input type="checkbox"/> | Thermoforming <input type="checkbox"/> | Finishing <input type="checkbox"/> | Rec/Store/Packaging <input type="checkbox"/> | Other <input type="checkbox"/> | Large Fab <input type="checkbox"/> | Composite <input type="checkbox"/> | Supplier <input type="checkbox"/> |  |
| Skid-tube <input type="checkbox"/>                           | Crosstube <input type="checkbox"/>  | Water Jet <input type="checkbox"/>  | Engineering <input type="checkbox"/> |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Machining <input type="checkbox"/>                           | Small Fab <input type="checkbox"/>  | Prod. Eng. Coord. <input type="checkbox"/>  | Quality <input type="checkbox"/>     |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Thermoforming <input type="checkbox"/>                       | Finishing <input type="checkbox"/>  | Rec/Store/Packaging <input type="checkbox"/>  | Other <input type="checkbox"/>       |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Large Fab <input type="checkbox"/>                           | Composite <input type="checkbox"/>  | Supplier <input type="checkbox"/>   |                                      |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |

| Root Cause                             | Date | Step | Qty | Description of work order update or Non-conformance | Initial Chief Eng | Action Description | Sign & Date | Verification | QC Inspector |
|--|------|------|-----|---|-------------------|--------------------|-------------|--------------|--------------|
| Doc/Data <input type="checkbox"/>      |      |      |     |   |                   |                    |             |              |              |
| Equip/Tooling <input type="checkbox"/> |      |      |     |   |                   |                    |             |              |              |
| Operator <input type="checkbox"/>      |      |      |     |   |                   |                    |             |              |              |
| Material <input type="checkbox"/>      |      |      |     |   |                   |                    |             |              |              |
| Setup <input type="checkbox"/>         |      |      |     |   |                   |                    |             |              |              |
| Other <input type="checkbox"/>         |      |      |     |   |                   |                    |             |              |              |
| Process <input type="checkbox"/>       |      |      |     |   |                   |                    |             |              |              |
| Supplier <input type="checkbox"/>      |      |      |     |   |                   |                    |             |              |              |
| Training <input type="checkbox"/>      |      |      |     |   |                   |                    |             |              |              |
| Unapproved <input type="checkbox"/>    |      |      |     |   |                   |                    |             |              |              |

**FAULT CATEGORY**

| Landing Gear  | General                                 | Other  |
|---|---|--|
| <input type="checkbox"/> Bending                      | <input type="checkbox"/> Bend           | <input type="checkbox"/> Grain                           |
| <input type="checkbox"/> Centre Not Concentric to O/S | <input type="checkbox"/> BOM/Route      | <input type="checkbox"/> Hardware                        |
| <input type="checkbox"/> Cracks                       | <input type="checkbox"/> Broken/Damaged | <input type="checkbox"/> Inspection Incomplete           |
| <input type="checkbox"/> Crushed/Crimped.             | <input type="checkbox"/> Burrs          | <input type="checkbox"/> Instructions Incomplete/Unclear |
| <input type="checkbox"/> Cuffs                        | <input type="checkbox"/> Contamination  | <input type="checkbox"/> Maintenance                     |
| <input type="checkbox"/> Heat Treat                   | <input type="checkbox"/> Countersink    | <input type="checkbox"/> Mislabeled                      |
| <input type="checkbox"/> Inspection Strip in Tube     | <input type="checkbox"/> Cut Too Short  | <input type="checkbox"/> Misread                         |
| <input type="checkbox"/> Ripples in Bend              | <input type="checkbox"/> Drill Holes    | <input type="checkbox"/> Offset                          |
| <input type="checkbox"/> Torque Waves in Extrusion    | <input type="checkbox"/> Drawing        | <input type="checkbox"/> Out of Calibration              |
| <input type="checkbox"/> Turning Sequence             | <input type="checkbox"/> Finish         | <input type="checkbox"/> Out of Sequence                 |
| <input type="checkbox"/> Wave/Twist in Tube           | <input type="checkbox"/> Folio          | <input type="checkbox"/> Outside Dimensions              |
|   |   | <input type="checkbox"/> Ovalized                        |
|   |   | <input type="checkbox"/> Over/Under tolerance            |
|   |   | <input type="checkbox"/> Part Incorrect                  |
|   |   | <input type="checkbox"/> Part Lost/Missing               |
|   |   | <input type="checkbox"/> Part Moved                      |
|   |   | <input type="checkbox"/> Positioned Wrong                |
|   |   | <input type="checkbox"/> Power Loss/Surge                |
|   |   | <input type="checkbox"/> Pressure/Forced                 |
|   |   | <input type="checkbox"/> Temperature/Cure                |
|   |   | <input type="checkbox"/> Weld                            |
|   |   | <input type="checkbox"/> Wrong Stock Pulled              |
|   |   | <input type="checkbox"/> Other                           |



# Picklist Print

November-29-12 9:50:35 AM

Page 1

Work Order ID: 94001

\*94001\*

Parent Item: D412-664-203TRN

\*D412-664-203TRN\*

Parent Item Name: Crosstube Turning Detail

Start Date: 29/11/2012

Required Date: 13/12/2012

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev:A 08-03-06 new issue DD verified by:eec  
IPP Rev B 08.04.02 Removed polish EC verified by: DD

| Component Item ID/<br>Item Name | Replacement<br>Item ID | Mfg/<br>Purch | Bin<br>Item | Primary<br>Location | Last<br>Location | Route<br>Seq ID | Unit of<br>Measure | Qty on<br>Hand | Qty per Kit | Total<br>Qty | Qty<br>Issued | Date<br>Issued | Status |
|---------------------------------|------------------------|---------------|-------------|---------------------|------------------|-----------------|--------------------|----------------|-------------|--------------|---------------|----------------|--------|
| D6009-129                       |                        | Manufactured  | No          |                     |                  | 120             | Each               | 35.0000        | 1           | 1            |               |                |        |

\*D6009-129\*

Crosstube Material

\*\*

## Location

## Loc Qty

## Loc Code

LG015

35

69801

1

75627

23

75630

11

mm-L 12/12/06

NCR: Yes / No

**WORK ORDER NON-CONFORMANCE / UPDATE**

DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA Closed: \_\_\_\_\_ Date: \_\_\_\_\_

|  |   |   |                                      |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
|--|---|---|--------------------------------------|------------------------------------|------------------------------------|--------------------------------------|------------------------------------|------------------------------------|--|----------------------------------|--|------------------------------------|--|--------------------------------|------------------------------------|------------------------------------|-----------------------------------|--|
| Work Order: _____<br><br>Part No. _____<br><br>NCR No. _____ | <b>DISPOSITION</b><br><br>Rework <input type="checkbox"/><br>Scrap <input type="checkbox"/><br>Use-as-is <input type="checkbox"/><br>Work Order Update <input type="checkbox"/> | <b>AGAINST DEPARTMENT/PROCESS</b><br><br><table style="width: 100%;"> <tr> <td>Skid-tube <input type="checkbox"/></td> <td>Crosstube <input type="checkbox"/></td> <td>Water Jet <input type="checkbox"/></td> <td>Engineering <input type="checkbox"/></td> </tr> <tr> <td>Machining <input type="checkbox"/></td> <td>Small Fab <input type="checkbox"/></td> <td>Prod. Eng. Coord. <input type="checkbox"/></td> <td>Quality <input type="checkbox"/></td> </tr> <tr> <td>Thermoforming <input type="checkbox"/></td> <td>Finishing <input type="checkbox"/></td> <td>Rec/Store/Packaging <input type="checkbox"/></td> <td>Other <input type="checkbox"/></td> </tr> <tr> <td>Large Fab <input type="checkbox"/></td> <td>Composite <input type="checkbox"/></td> <td>Supplier <input type="checkbox"/></td> <td></td> </tr> </table> | Skid-tube <input type="checkbox"/>   | Crosstube <input type="checkbox"/> | Water Jet <input type="checkbox"/> | Engineering <input type="checkbox"/> | Machining <input type="checkbox"/> | Small Fab <input type="checkbox"/> | Prod. Eng. Coord. <input type="checkbox"/> | Quality <input type="checkbox"/> | Thermoforming <input type="checkbox"/> | Finishing <input type="checkbox"/> | Rec/Store/Packaging <input type="checkbox"/> | Other <input type="checkbox"/> | Large Fab <input type="checkbox"/> | Composite <input type="checkbox"/> | Supplier <input type="checkbox"/> |  |
| Skid-tube <input type="checkbox"/>                           | Crosstube <input type="checkbox"/>  | Water Jet <input type="checkbox"/>  | Engineering <input type="checkbox"/> |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Machining <input type="checkbox"/>                           | Small Fab <input type="checkbox"/>  | Prod. Eng. Coord. <input type="checkbox"/>  | Quality <input type="checkbox"/>     |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Thermoforming <input type="checkbox"/>                       | Finishing <input type="checkbox"/>  | Rec/Store/Packaging <input type="checkbox"/>  | Other <input type="checkbox"/>       |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Large Fab <input type="checkbox"/>                           | Composite <input type="checkbox"/>  | Supplier <input type="checkbox"/>   |                                      |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |

| Root Cause    | Date | Step | Qty | Description of work order update or Non-conformance | Initial Chief Eng | Action Description | Sign & Date | Verification | QC Inspector |
|---------------|------|------|-----|---|-------------------|--------------------|-------------|--------------|--------------|
| Doc/Data      |      |      |     |   |                   |                    |             |              |              |
| Equip/Tooling |      |      |     |   |                   |                    |             |              |              |
| Operator      |      |      |     |   |                   |                    |             |              |              |
| Material      |      |      |     |   |                   |                    |             |              |              |
| Setup         |      |      |     |   |                   |                    |             |              |              |
| Other         |      |      |     |   |                   |                    |             |              |              |
| Process       |      |      |     |   |                   |                    |             |              |              |
| Supplier      |      |      |     |   |                   |                    |             |              |              |
| Training      |      |      |     |   |                   |                    |             |              |              |
| Unapproved    |      |      |     |   |                   |                    |             |              |              |

**FAULT CATEGORY**

| Landing Gear  | General                                 | Other  |
|---|---|--|
| <input type="checkbox"/> Bending                      | <input type="checkbox"/> Bend           | <input type="checkbox"/> Grain                           |
| <input type="checkbox"/> Centre Not Concentric to O/S | <input type="checkbox"/> BOM/Route      | <input type="checkbox"/> Hardware                        |
| <input type="checkbox"/> Cracks                       | <input type="checkbox"/> Broken/Damaged | <input type="checkbox"/> Inspection Incomplete           |
| <input type="checkbox"/> Crushed/Crimped.             | <input type="checkbox"/> Burrs          | <input type="checkbox"/> Instructions Incomplete/Unclear |
| <input type="checkbox"/> Cuffs                        | <input type="checkbox"/> Contamination  | <input type="checkbox"/> Maintenance                     |
| <input type="checkbox"/> Heat Treat                   | <input type="checkbox"/> Countersink    | <input type="checkbox"/> Mislabeled                      |
| <input type="checkbox"/> Inspection Strip in Tube     | <input type="checkbox"/> Cut Too Short  | <input type="checkbox"/> Misread                         |
| <input type="checkbox"/> Ripples in Bend              | <input type="checkbox"/> Drill Holes    | <input type="checkbox"/> Offset                          |
| <input type="checkbox"/> Torque Waves in Extrusion    | <input type="checkbox"/> Drawing        | <input type="checkbox"/> Out of Calibration              |
| <input type="checkbox"/> Turning Sequence             | <input type="checkbox"/> Finish         | <input type="checkbox"/> Out of Sequence                 |
| <input type="checkbox"/> Wave/Twist in Tube           | <input type="checkbox"/> Folio          | <input type="checkbox"/> Outside Dimensions              |
|   |   | <input type="checkbox"/> Ovalized                        |
|   |   | <input type="checkbox"/> Over/Under tolerance            |
|   |   | <input type="checkbox"/> Part Incorrect                  |
|   |   | <input type="checkbox"/> Part Lost/Missing               |
|   |   | <input type="checkbox"/> Part Moved                      |
|   |   | <input type="checkbox"/> Positioned Wrong                |
|   |   | <input type="checkbox"/> Power Loss/Surge                |
|   |   | <input type="checkbox"/> Pressure/Forced                 |
|   |   | <input type="checkbox"/> Temperature/Cure                |
|   |   | <input type="checkbox"/> Weld                            |
|   |   | <input type="checkbox"/> Wrong Stock Pulled              |
|   |   | <input type="checkbox"/> Other                           |

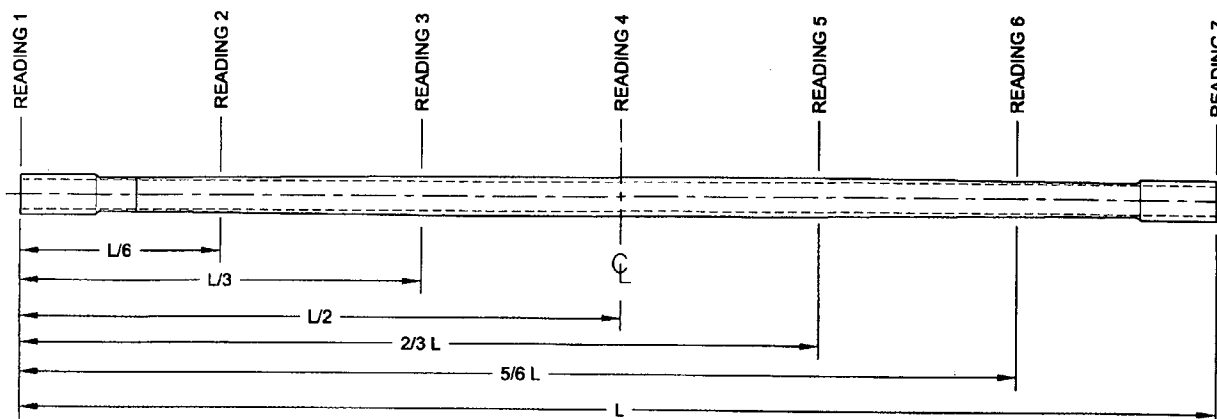
|   |                     |                     |
|---|---------------------|---------------------|
| <b>DART AEROSPACE LTD</b>                             | <b>Work Order:</b>  | <b>94001</b>        |
| <b>Description:</b> Crosstube Assembly (412 High Aft) | <b>Part Number:</b> | <b>D412-664-243</b> |
| <b>Inspection Dwg:</b> D412-664-243 <b>Rev:</b> E     |                     | <b>Page 1 of 2</b>  |

### FIRST ARTICLE INSPECTION CHECKLIST

|        | Inspection Sheet<br>Drawing Dimension | Tolerance     | Actual<br>Dimension | Accept | Reject | Method of<br>Inspection | Comments    |
|--------|---------------------------------------|---------------|---------------------|--------|--------|-------------------------|-------------|
| SIDE A | 2.684                                 | +0.005/-0.000 | 2.686               | /      |        | VERN                    | CNC-03      |
|        | 2.748                                 | +0.005/-0.000 | 2.749               | /      |        |                         |             |
|        | 2.884                                 | +0.005/-0.000 | 2.886               | /      |        |                         |             |
|        | 3.019                                 | +0.005/-0.000 | 3.021               | /      |        |                         |             |
|        | 3.163                                 | +0.005/-0.000 | 3.166               | /      |        |                         |             |
|        | 3.308                                 | +0.005/-0.000 | 3.313               | /      |        |                         |             |
|        | 3.429                                 | +0.005/-0.000 | 3.430               | /      |        |                         |             |
|        | 2.990                                 | +0.005/-0.000 | 2.993               | /      |        |                         |             |
|        | 2.618                                 | +0.005/-0.000 | 2.621               | /      |        |                         |             |
|        |                                       |               |                     |        |        |                         |             |
|        | 0.200                                 | +/-0.010      | 200                 | /      |        |                         |             |
|        | R0.063                                | +/-0.010      | 063                 | /      |        | R6                      |             |
|        | R0.500                                | +/-0.010      | 500                 | /      |        | R6                      |             |
|        | 4.971                                 | +/-0.030      | 4.986               | /      |        | VERN                    | VERN CNC-08 |
|        |                                       |               |                     |        |        |                         |             |
| SIDE B | 2.684                                 | +0.005/-0.000 | 2.688               | /      |        | VERN                    | CNC-08      |
|        | 2.748                                 | +0.005/-0.000 | 2.753               | /      |        |                         |             |
|        | 2.884                                 | +0.005/-0.000 | 2.889               | /      |        |                         |             |
|        | 3.019                                 | +0.005/-0.000 | 3.024               | /      |        |                         |             |
|        | 3.163                                 | +0.005/-0.000 | 3.168               | /      |        |                         |             |
|        | 3.308                                 | +0.005/-0.000 | 3.312               | /      |        |                         |             |
|        | 3.429                                 | +0.005/-0.000 | 3.431               | /      |        |                         |             |
|        | 2.990                                 | +0.005/-0.000 | 2.993               | /      |        |                         |             |
|        | 2.618                                 | +0.005/-0.000 | 2.623               | /      |        |                         |             |
|        |                                       |               |                     |        |        |                         |             |
|        | 0.200                                 | +/-0.010      | 200                 | /      |        |                         |             |
|        | R0.063                                | +/-0.010      | 063                 | /      |        | R6                      | R6          |
|        | R0.500                                | +/-0.010      | 500                 | /      |        | R6                      | R6          |
|        | 4.971                                 | +/-0.030      | 4.996               | /      |        | VERN                    | CNC-08      |
|        | 124.100                               | +/-0.020      | 124.115             | /      |        | tape                    | LG-15       |

|   |                     |                    |
|---|---------------------|--------------------|
| <b>DART AEROSPACE LTD</b>                             | <b>Work Order:</b>  | 94001              |
| <b>Description:</b> Crosstube Assembly (412 High Aft) | <b>Part Number:</b> | D412-664-243       |
| <b>Inspection Dwg:</b> D412-664-243 <b>Rev:</b> E     |                     | <b>Page 2 of 2</b> |

### WALL THICKNESS MEASUREMENT



| Location                 | WALL THICKNESS MEASUREMENT (IN) |      |                      |      | Deviation<br>$\Delta w$<br>(max-min) | TOLERANCE |
|--------------------------|---------------------------------|------|----------------------|------|--------------------------------------|-----------|
|                          | w1                              | w2   | w3                   | w4   |                                      |           |
| READING 1<br>L = 0"      | .384                            | .366 | .381                 | .389 | .023                                 | 0.073"    |
| READING 2<br>L = 20.68   | .329                            | .324 | .313                 | .315 | .016                                 |           |
| READING 3<br>L = 41.36   | .505                            | .488 | <del>.315</del> .472 | .488 | .017                                 |           |
| READING 4<br>L = 62.05   | .629                            | .635 | .634                 | .630 | .006                                 |           |
| READING 5<br>L = 82.73   | .484                            | .479 | .491                 | .488 | .012                                 |           |
| READING 6<br>L = 103.41  | .327                            | .323 | .312                 | .312 | .015                                 |           |
| READING 7<br>L = 124.100 | .388                            | .368 | .370                 | .389 | .021                                 |           |

#### Calibration Result

Actual Block Thickness: 280 - 750

Sitiescan 250 Measured Thickness: 250 - 750

|                     |          |
|---------------------|----------|
| <b>Measured by:</b> | KL       |
| <b>Date:</b>        | 12-12-08 |

|                    |          |
|--------------------|----------|
| <b>Audited by:</b> | JW       |
| <b>Date:</b>       | 12-12-10 |

|                              |  |
|------------------------------|--|
| <b>Preliminary Approval:</b> |  |
| <b>Date:</b>                 |  |

| Rev | Date     | Change                                | Revised by | Approved |
|-----|----------|---------------------------------------|------------|----------|
| A   | 04.06.16 | New Issue (P/O D412-664-203)          | KJ/JLM     |          |
| B   | 06.03.09 | Dwg Rev updated                       | KJ/JLM     |          |
| C   | 07.05.08 | Tolerance updated for dimension 4.971 | KJ/JLM     |          |
| D   | 10.02.02 | Dimension 124.100 was 124.09          | KJ         |          |
| E   | 12.06.04 | Wall thickness form added             | KJ         |          |

| Item | Qty<br>-243 | Part Number    | Description   |
|------|-------------|----------------|---|
| 1    | X           | D412-664-243   | CROSSTUBE ASSEMBLY (412 HIGH AFT)   |
| 2    | 1           | D6009-129      | CROSSTUBE   |
| 3    | 2           | D3595-063-570  | RUBBER CUSHION  |
| 4    | 1           | D2896-1        | SUPPORT   |
| 5    | 2           | D3189-1        | CHAFING SHIELD  |
| 6    | 2           | D2856-600-1009 | ABRASION STRIP  |
| 7    | 4           | MS21920-28     | CLAMP   |
| 8    | 2           | MS21920-30     | CLAMP (OR MS21920-32)   |
| 9    | A/R         | MAGNOBOND 6398 | ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE<br>(TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2<br>ADHESIVE) |

# **GENERAL NOTES:**

- 1) MATERIAL: MANUFACTURED FROM D6009-129  
FINISHED LENGTH = 124.100±0.020 (BEFORE BENDING/TRIMMING)
- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: SCRIBE DART PART NUMBER "D412-664-243" AND BATCH NUMBER ON INSIDE OF CUFF USING VIBRATING STYLUS.
- 7) WEIGHT: 47.0 lbs (PER IIN-D212-664)
- 8) PART IS SYMMETRIC ABOUT CENTERLINE.
- 9) RUN CUTTER OFF PART. BLEND OUT EDGE LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 11) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 12) INSTALL D2896-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2896-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 13) INSTALL MS21920-30 CLAMPS (OR -32) WITH D3595-063-570 RUBBER CUSHIONS TO SECURE THE D2896-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE OF CROSSTUBE SUPPORT.
- 14) INSTALL D2856-600-1009 ABRASION STRIPS WITH A 0.13 REF GAP ON BOTTOM SIDE OF CROSSTUBE PER QSI 035.
- 15) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 16) TORQUE CLAMPS 80 TO 100 IN.-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

SHO  
RE UP  
ENCLOSURE  
UNCON  
SUB  
WITH  
V

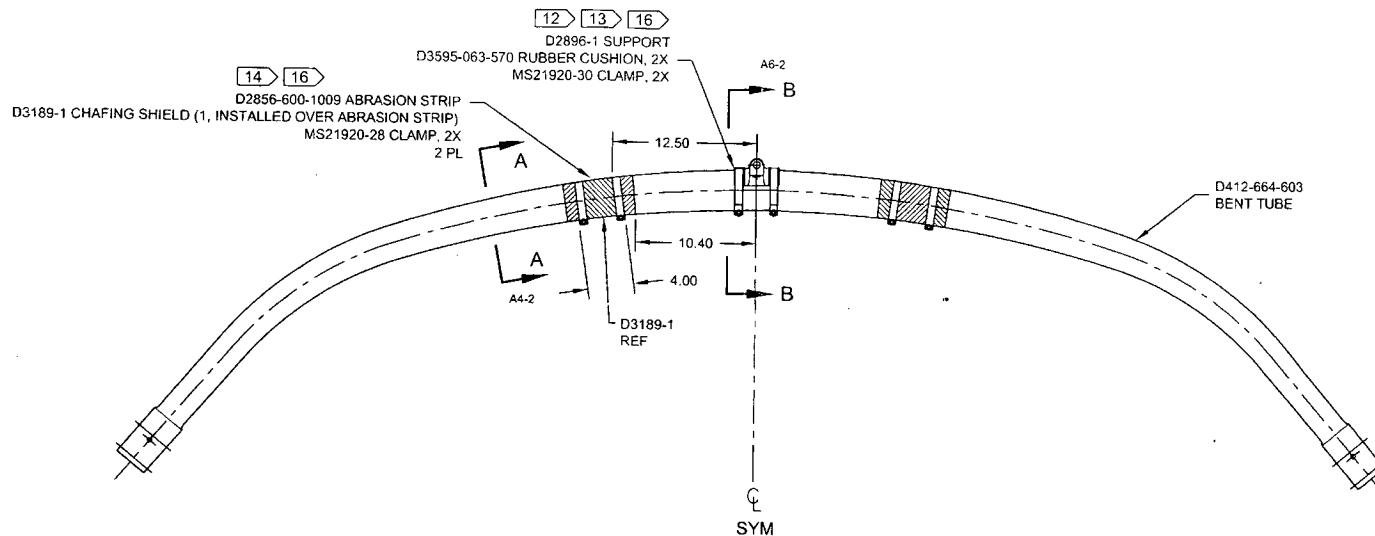
NO. 9.4001 ML5  
12-11-29

2 DEO ATTACHED

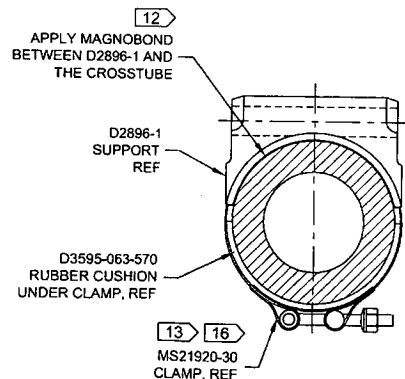
RELEASED  
2009-10-29

|            |  |  |              |
|------------|--|--|--------------|
| E          | REFORMAT/REVISE GENERAL NOTES;<br>REORGANIZED VIEWS AND REFORMATTED DRAWING<br>TO CURRENT STANDARDS; RELOCATED FLAG #6 PER<br>PAR 08-046 (ZN A5-3); ADD TOLERANCE (ZN B6-3, C4-3,<br>C8-3 & C5-3); MOVED TURNING DETAIL & UPDATED<br>TOLERANCE TO SHEET 4. | RF   | 09.09.30     |
| D          | REMOVE D2732-058, CHANGE TO D3595-063-570  | PH   | 07.03.09     |
| C          | REMOVE D2856-600-1087. ADD D2732-058 &<br>MAGNOBOND 6398. MS21920-32 WAS MS21920-30  | MB   | 06.10.27     |
| B          | ADD HOLES FOR COMPATABILITY WITH BHT/AA<br>SKIDTUBES   | PH   | 05.02.04     |
| A          | NEW ISSUE  | PH   | 01.10.17     |
| REV.       | DESCRIPTION  | BY   | DATE         |
| DESIGN     | PH   | DART AEROSPACE LTD<br>HAWKESBURY, ONTARIO, CANADA  |              |
| DRAWN      | RF   |  |              |
| CHECKED    | PH   | DRAWING NO.  | REV. E       |
| MFG. APPR. | PH   | D412-664-243   | SHEET 1 OF 4 |
| APPROVED   | PH   | TITLE  | SCALE        |
| DE APPR.   | PH   | CROSSTUBE ASSEMBLY (412 HI AFT)  | NTS          |
| DATE       | 09.09.30   | COPYRIGHT © 2001 BY DART AEROSPACE LTD<br>THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL. IT IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS<br>NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT<br>WRITTEN PERMISSION FROM DART AEROSPACE LTD. |              |

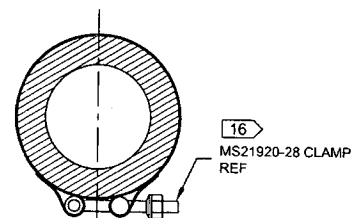
94001



**D212-664-243**  
**ASSEMBLY DETAIL**



**SECTION B-B** D4-2  
SCALE 4X



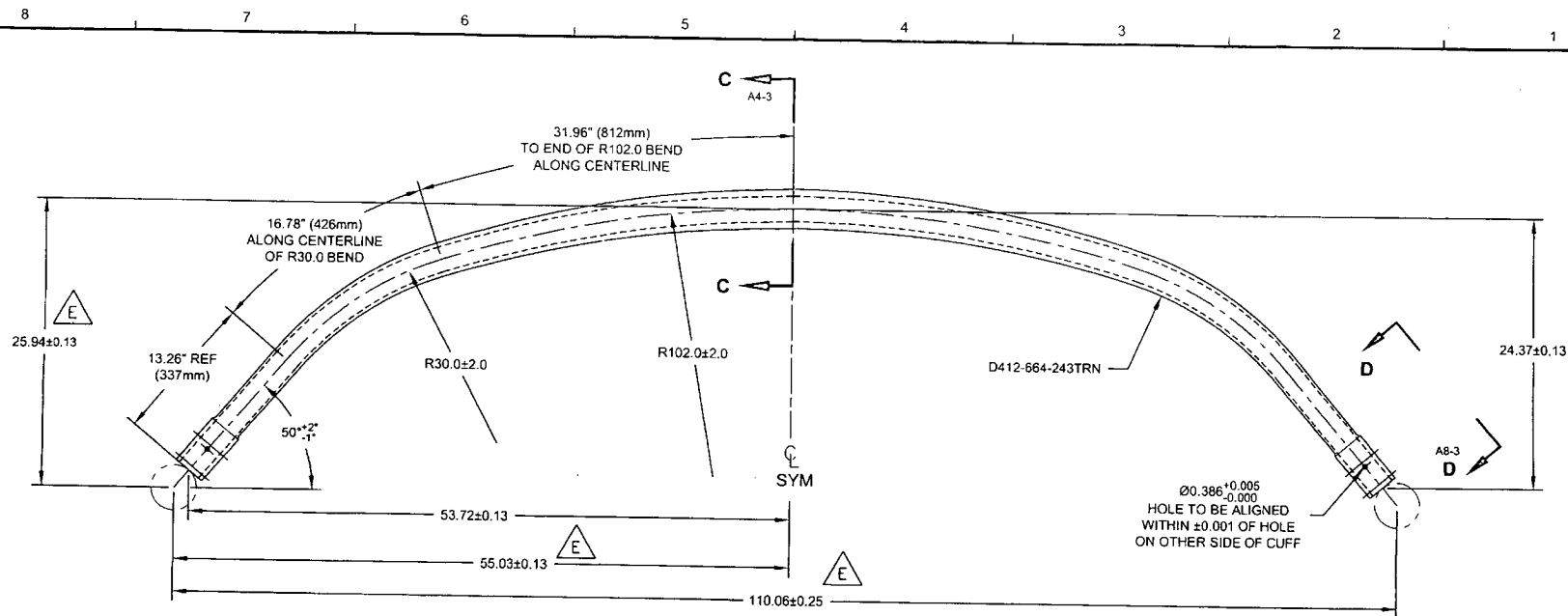
**SECTION A-A** C6-2  
SCALE 4X

2 DEO ATTACHED

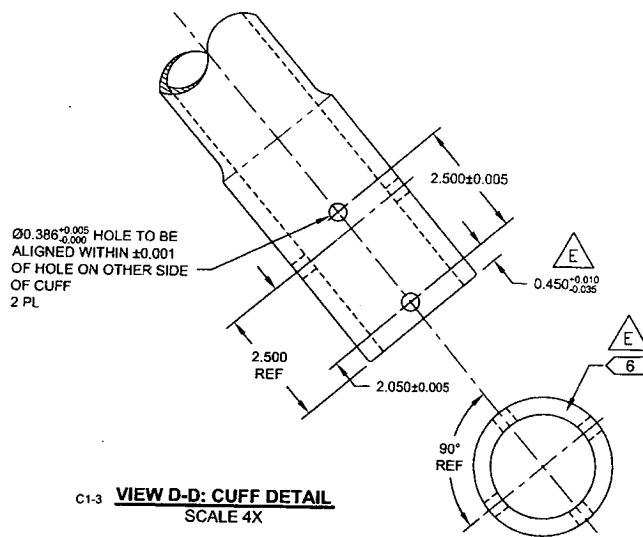
**RELEASED**  
2009-10-28  
NMP

|  |          |  |              |
|--|----------|--|--------------|
| DESIGN   | PH       | <b>DART AEROSPACE LTD</b>              |              |
| DRAWN  | RF       | HAWKESBURY, ONTARIO, CANADA            |              |
| CHECKED  | Q        | DRAWING NO.                            | REV. E       |
| MFG. APPR.   | S        | D412-664-243                           | SHEET 2 OF 4 |
| APPROVED   | MP       | TITLE                                  | SCALE        |
| DE APPR.   | HA       | CROSSTUBE ASSEMBLY (412 HI AFT)        | NTS          |
| DATE   | 09.09.30 | COPYRIGHT © 2001 BY DART AEROSPACE LTD |              |
| THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS UNDERSTANDING THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD. |          |  |              |

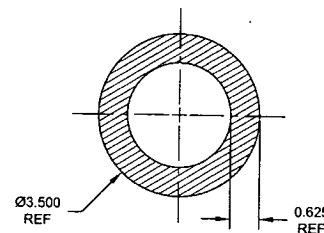
074001



**D412-664-603** 10  
**BENDING AND DRILLING DETAIL** E



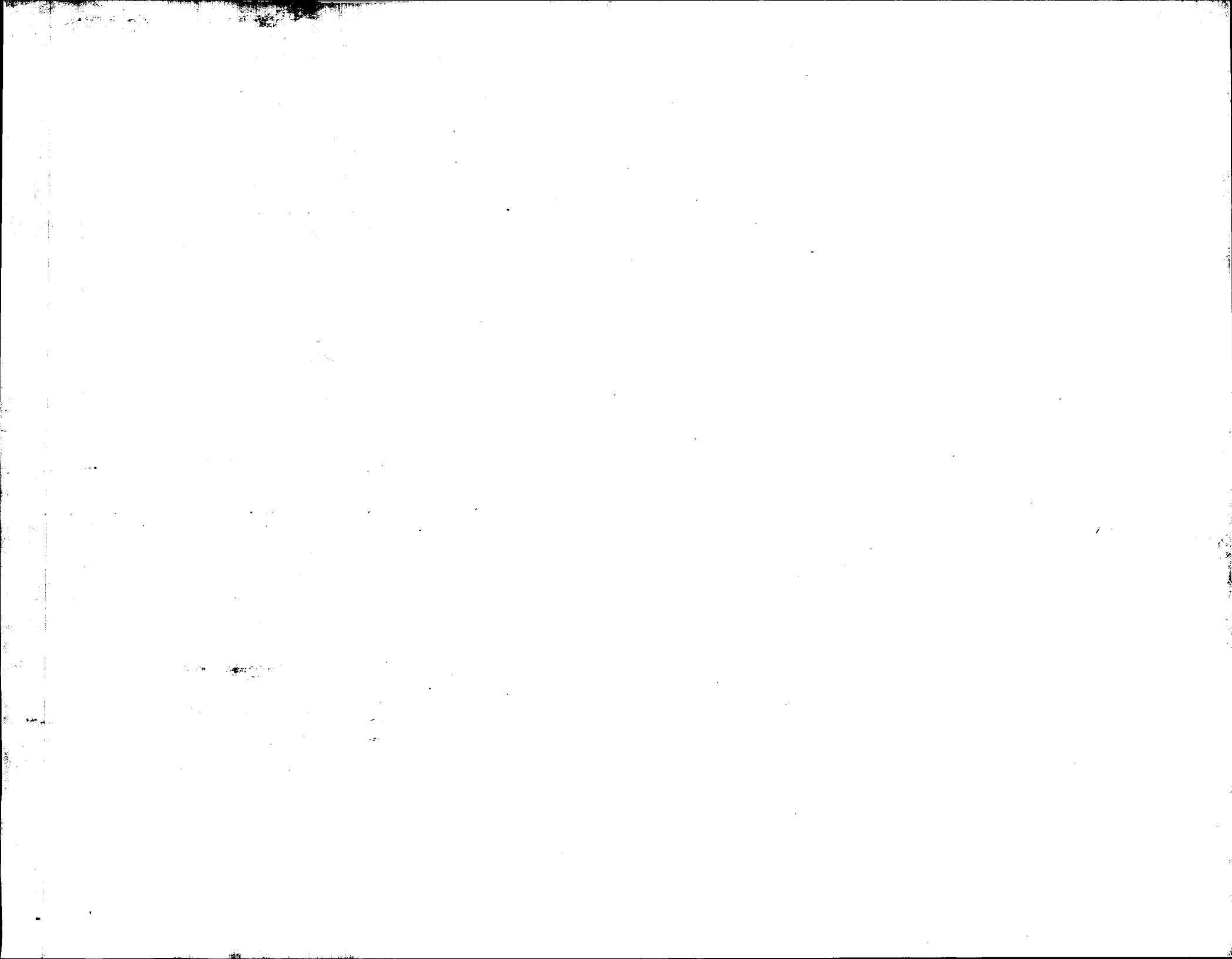
C1-3 **VIEW D-D: CUFF DETAIL**  
 SCALE 4X



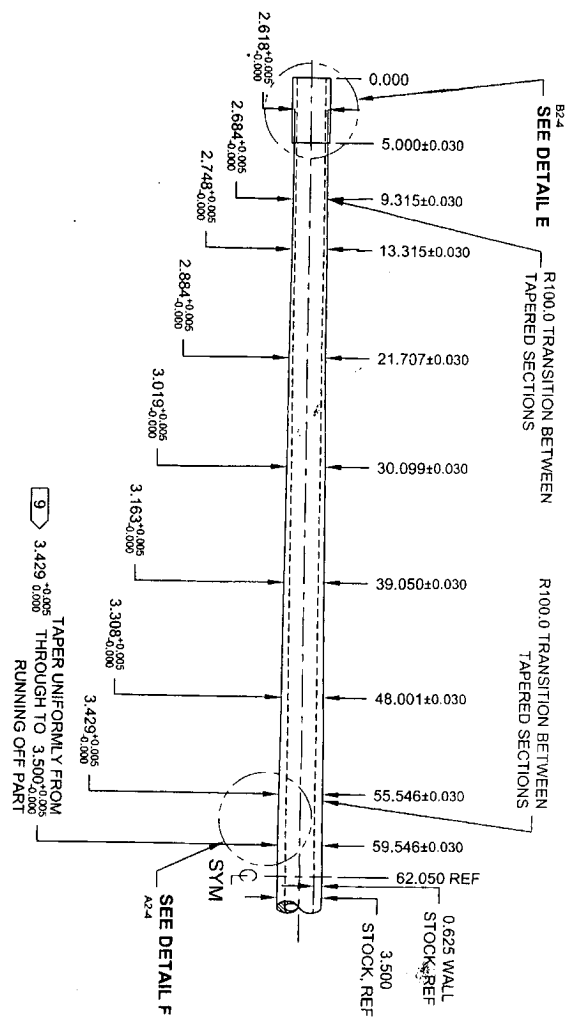
**SECTION C-C** D5-3  
 SCALE 4X

② DEO ATTACHED  
**RELEASED**  
 2009-10-29  
 MP

|  |          |  |
|--|----------|--|
| DESIGN   | PH       | <b>DART AEROSPACE LTD</b>              |
| DRAWN  | RF       | HAWKESBURY, ONTARIO, CANADA            |
| CHECKED  | Q        | DRAWING NO. REV. E                     |
| MFG. APPR.   | DS       | D412-664-243 SHEET 3 OF 4              |
| APPROVED   | MP       | TITLE SCALE                            |
| DE APPR.   | TH       | CROSSTUBE ASSEMBLY (412 HI AFT) NTS    |
| DATE   | 09.09.30 | COPYRIGHT © 2001 BY DART AEROSPACE LTD |
| THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD. |          |  |

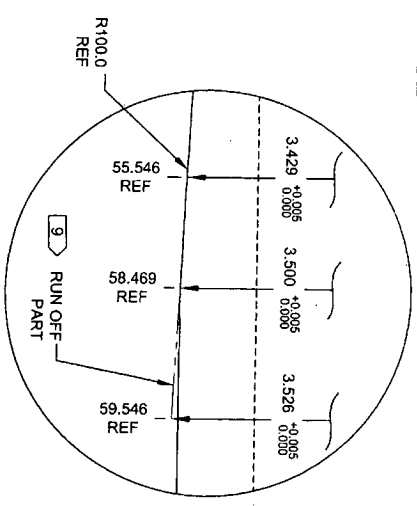
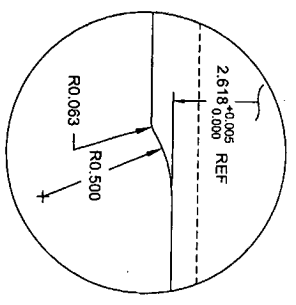






**DETAIL E:  
CROSS-TUBE CUFF**  
SCALE 5X

**DA12-664-243TRN  
TURNING DETAIL**



**DETAIL F:  
TAPER RUN-OFF**  
SCALE 5X

|               |                                  |       |              |
|---------------|----------------------------------|-------|--------------|
| DESIGN        | DA12-664-243                     | DATE  | 09.09.30     |
| DRAWN         | RF                               | REV.  | E            |
| CHECKED       | RF                               | REV.  | E            |
| MFG. APPR.    | RF                               | REV.  | E            |
| APPROVED      | RF                               | REV.  | E            |
| DE APPR.      | RF                               | REV.  | E            |
| TITLE         | CROSS-TUBE ASSEMBLY (412 HI AFT) | SCALE | NTS          |
| COMPONENT QTY | 1                                | BY    | DA12-664-243 |
| REVISION      | 1                                | DATE  | 09.09.30     |

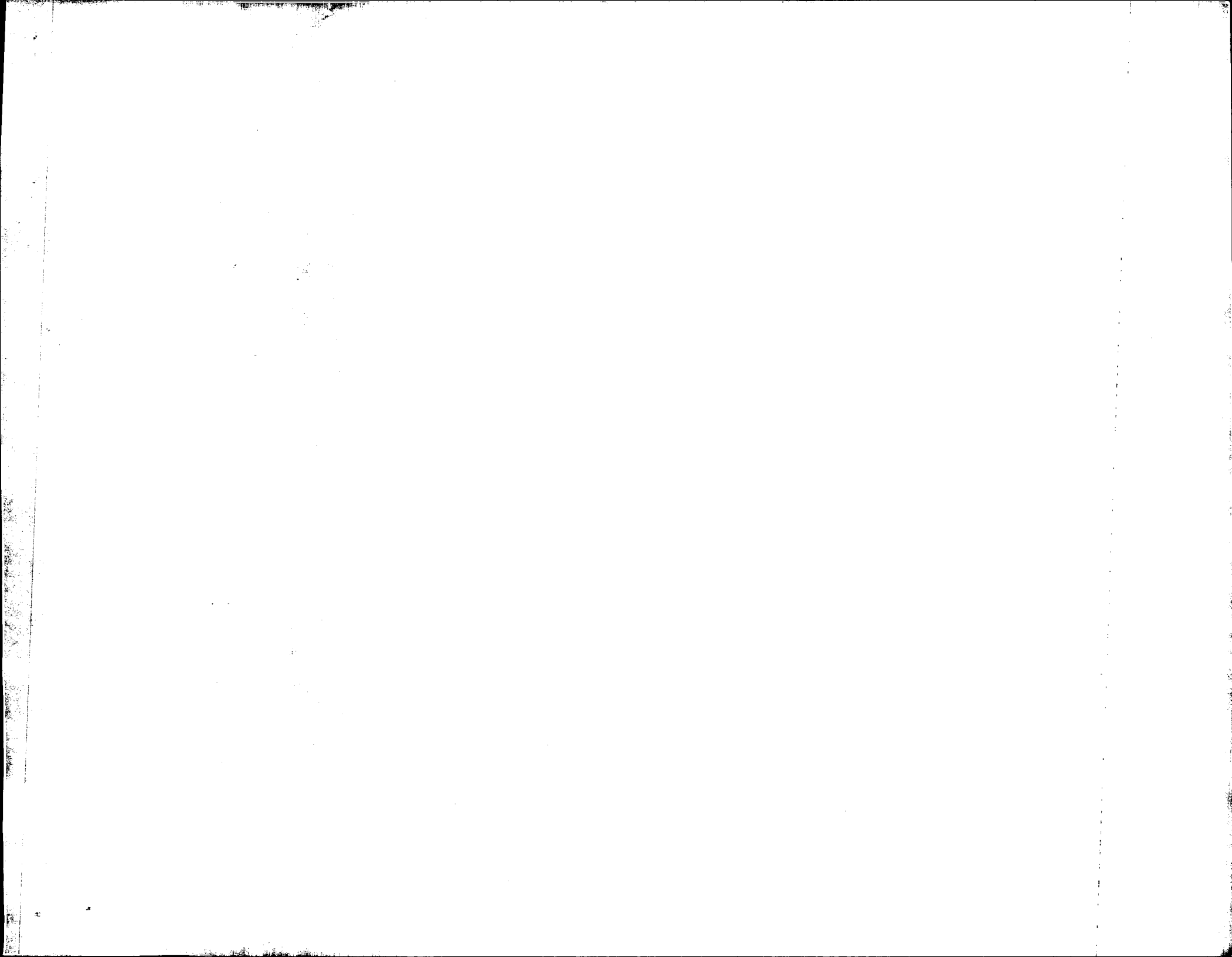
**DEO ATTACHED**

**RELEASED**  
2009-10-29

**DART AEROSPACE LTD**  
HAWKESBURY, ONTARIO, CANADA

THIS DOCUMENT IS A PROPERTY OF DART AEROSPACE LTD. IT IS TO BE USED FOR THE PURPOSES SPECIFIED IN THE ORDER. IT IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, WITHOUT PERMISSION IN WRITING FROM DART AEROSPACE LTD.

94001



94001

|                             |  |               |   |  |                                |                           |              |
|-----------------------------|--|---------------|---|--|--------------------------------|---------------------------|--------------|
| DRAWING NO.<br>D412-664-243 | TITLE<br>CROSSTUBE ASSEMBLY (412 HI AFT) | REV. E        | DART AEROSPACE LTD<br>ENGINEERING ORDER |  | D.E.O. NO.<br>D412-664-243-E-1 | SHEET NO.<br>SHEET 1 OF 2 | SCALE<br>NTS |
| DRAWN                       | CHECKED                                  | MFG. APPR.    | APPROVED                                |  | DE APPR.                       |                           |              |
| DATE 11.03.31               | DATE 11/03/31                            | DATE 11.03.31 | DATE 11/03/31                           |  | DATE 11.03.31                  |                           |              |

**PURPOSE:**

REMOVED ABRASION STRIP IN FAVOR OF A THIN LAYER OF PROSEAL 890.

**CHANGE:**

PARTS LIST IS AMENDED AS FOLLOWS:

**IS:**

| Item | Qty<br>-243 | Part Number    | Description    |
|------|-------------|----------------|----------------|
| 6    | 0           | D2856-600-1009 | ABRASION STRIP |

**WAS:**

|   |   |                |                |
|---|---|----------------|----------------|
| 6 | 2 | D2856-600-1009 | ABRASION STRIP |
|---|---|----------------|----------------|

NOTES 2 AND 14, SHEET 1 ARE AMENDED AS FOLLOWS:

**IS:**

- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
MASK UNDERSIDE OF CROSSTUBE AS SHOWN (HATCHED AREA)  
PAINT OUTSIDE PER DART QSI 005 4.2  
AFTER PAINTING, APPLY CLEAR COAT ON HATCHED AREA
- 14) APPLY A THIN COAT OF PROSEAL 890 ON INSIDE CONCAVE SURFACE OF D3189-1  
CHAFING SHIELD AND LET CURE PER MANUFACTURER'S INSTRUCTIONS. INSTALL  
PROSEALED D3189-1 CHAFING SHIELD ONTO CROSSTUBE BY APPLYING A THIN COAT OF  
PROSEAL 890 ONTO CROSSTUBE. BE SURE TO ELIMINATE ANY AIR GAPS.

**WAS:**

- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART QSI 005 4.2
- 14) INSTALL D2856-600-1009 ABRASION STRIPS WITH A 0.13 REF GAP ON BOTTOM SIDE OF  
CROSSTUBE PER QSI 035.

RELEASED  
2011-04-07

9400

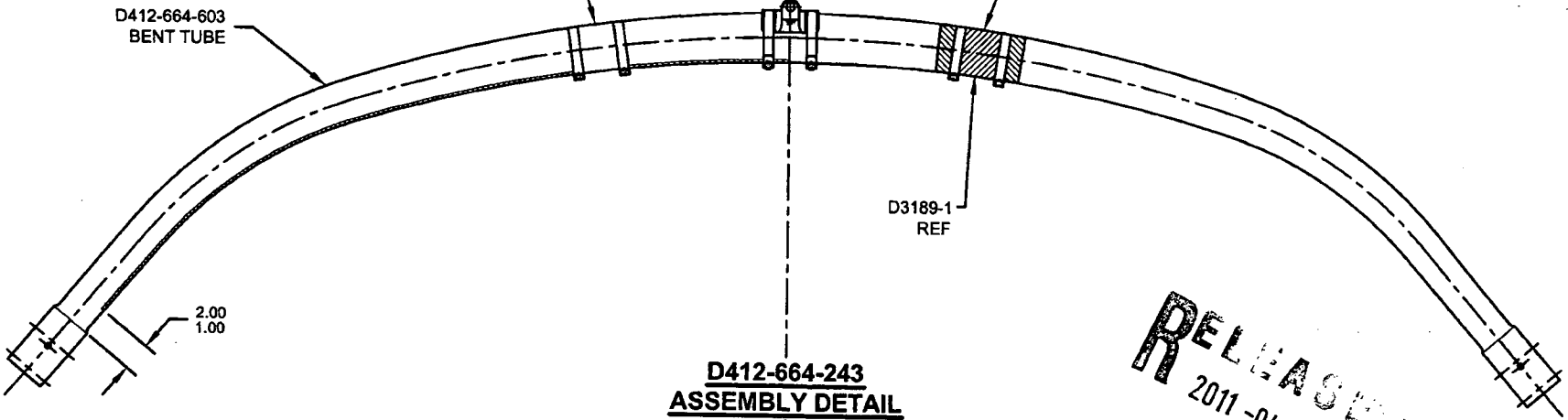
|                             |  |                                  |   |                                |                           |              |
|-----------------------------|--|----------------------------------|---|--------------------------------|---------------------------|--------------|
| DRAWING NO.<br>D412-664-243 | TITLE<br>CROSSTUBE ASSEMBLY (412 HI AFT) | REV. E                           | DART AEROSPACE LTD<br>ENGINEERING ORDER | D.E.O. NO.<br>D412-664-243-E-1 | SHEET NO.<br>SHEET 2 OF 2 | SCALE<br>NTS |
| DRAWN<br><i>[Signature]</i> | CHECKED<br><i>[Signature]</i>            | MFG. APPR.<br><i>[Signature]</i> | APPROVED<br><i>[Signature]</i>          | DE APPR.<br><i>[Signature]</i> |                           |              |
| DATE<br>11.03.31            | DATE<br>11.03.31                         | DATE<br>11.03.31                 | DATE<br>11.03.31                        | DATE<br>11.03.31               |                           |              |

**IS:**

16 14  
 D3189-1 CHAFING SHIELD (1, INSTALLED OVER PROSEAL 890)  
 MS21920-28 CLAMP, 2X  
 2 PL

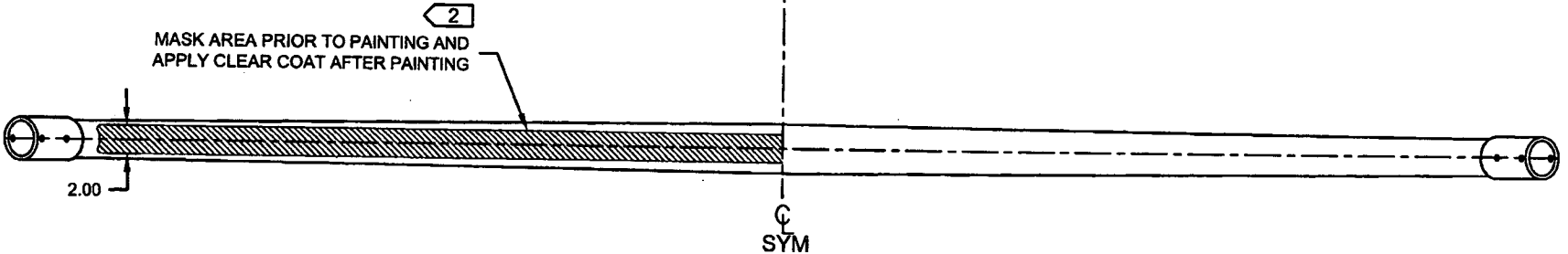
**WAS:**

14 16  
 D2856-600-1009 ABRASION STRIP  
 D3189-1 CHAFING SHIELD (1, INSTALLED OVER ABRASION STRIP)  
 MS21920-28 CLAMP, 2X  
 2 PL



**D412-664-243  
ASSEMBLY DETAIL**

RELEASED  
2011-04-07  
*[Signature]*



94001

|                             |                                       |                         |   |  |                                |                           |              |
|-----------------------------|---------------------------------------|-------------------------|---|--|--------------------------------|---------------------------|--------------|
| DRAWING NO.<br>D412-664-243 | TITLE<br>CROSSTUBE ASS'Y (412 HI AFT) | REV. E                  | <b>DART AEROSPACE LTD<br/>ENGINEERING ORDER</b> |  | D.E.O. NO.<br>D412-664-243-E-2 | SHEET NO.<br>SHEET 1 OF 1 | SCALE<br>NTS |
| DRAWN<br><i>MP</i>          | CHECKED<br><i>ASS</i>                 | MFG. APPR.<br><i>RE</i> | APPROVED<br><i>MP</i>                           |  | DE APPR.<br><i>MP</i>          |                           |              |
| DATE<br>11.09.07            | DATE<br>11.09.19                      | DATE<br>11.09.19        | DATE<br>11.09.19                                |  | DATE<br>11.09.19               |                           |              |

**PURPOSE:**

REPLACE MAGNOBOND WITH 3M DP460 SCOTCH-WELD EPOXY ADHESIVE

**CHANGE:**

IS:

| Item | Qty<br>-243 | Part Number       | Description                    |
|------|-------------|-------------------|--------------------------------|
| 9    | A/R         | SCOTCH-WELD DP460 | EPOXY ADHESIVE, 3M SCOTCH-WELD |

WAS:

|   |     |                |   |
|---|-----|----------------|---|
| 9 | A/R | MAGNOBOND 6398 | ROCKWELL SPECIFICATION RBO-120-023<br>ADHESIVE (TEXTRON/BELL SPEC. 299-947-100,<br>TYPE II, CLASS 2 ADHESIVE) |
|---|-----|----------------|---|

NOTE 12 & 16, SHEET 1 IS AMENDED AS FOLLOWS:

IS:

- 12) INSTALL D2896-1 CENTER SUPPORT USING A 0.04" TO 0.07" THICK LAYER OF SCOTCH-WELD DP460 PER QSI 015. LET CURE FOR 24 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 16) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. **PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER ADHESIVE HAS CURED FOR 24 HOURS.**

WAS:

- 12) INSTALL D2896-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2896-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 16) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

**RELEASED**  
2011-09-29  
*MP*

94001

|                             |  |                           |   |  |                                |                           |              |
|-----------------------------|--|---------------------------|---|--|--------------------------------|---------------------------|--------------|
| DRAWING NO.<br>D412-664-243 | TITLE<br>CROSSTUBE ASSEMBLY (412 HI AFT) | REV. E                    | DART AEROSPACE LTD<br>ENGINEERING ORDER |  | D.E.O. NO.<br>D412-664-243-E-4 | SHEET NO.<br>SHEET 1 OF 3 | SCALE<br>NTS |
| DRAWN<br>[Signature]        | CHECKED<br>[Signature]                   | MFG. APPR.<br>[Signature] | APPROVED<br>[Signature]                 |  | DE APPR.<br>[Signature]        |                           |              |
| DATE<br>12.08.21            | DATE<br>12.08.30                         | DATE<br>12.08.30          | DATE<br>12/8/30                         |  | DATE<br>12.08.30               |                           |              |

**PURPOSE:**

REMOVED ABRASION STRIP IN FAVOR OF A THIN LAYER OF PROSEAL 890. UPDATE INSTALLATION OF CHAFING SHIELDS AND REDUCE TORQUE TO 40-50 IN-LBS. THIS ENGINEERING ORDER SUPERCEDES DEO D412-664-243-E-1.

**CHANGE:**

PARTS LIST IS AMENDED AS FOLLOWS:

**IS:**

| Item | Qty<br>-243 | Part Number    | Description    |
|------|-------------|----------------|----------------|
| 6    | 0           | D2856-600-1009 | ABRASION STRIP |

**WAS:**

|   |   |                |                |
|---|---|----------------|----------------|
| 6 | 2 | D2856-600-1009 | ABRASION STRIP |
|---|---|----------------|----------------|

NOTES 2, 14, AND 16 ON SHEET 1 ARE AMENDED AS FOLLOWS:

**IS:**

- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
MASK UNDERSIDE OF CROSSTUBE AS SHOWN (HATCHED AREA)  
PAINT OUTSIDE PER DART QSI 005 4.2  
AFTER PAINTING, APPLY CLEAR COAT ON HATCHED AREA
- 14) APPLY A THIN COAT OF PROSEAL 890 ON INSIDE CONCAVE SURFACE OF D3189-1 CHAFING SHIELD AND LET CURE PER MANUFACTURER'S INSTRUCTIONS. INSTALL PROSEALED D3189-1 CHAFING SHIELD ONTO CROSSTUBE BY APPLYING A THIN COAT OF PROSEAL 890 ONTO CROSSTUBE. BE SURE TO ELIMINATE ANY AIR GAPS.
- 16) TORQUE CLAMPS ON D2896-1 SUPPORT 80 TO 100 IN-LB. **TORQUE CLAMPS ON D3189-1 CHAFING SHIELD 40 TO 50 IN-LB.** ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

**WAS:**

- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART QSI 005 4.2
- 14) INSTALL D2856-600-1009 ABRASION STRIPS WITH A 0.13 REF GAP ON BOTTOM SIDE OF CROSSTUBE PER QSI 035.
- 16) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

RELEASED  
2012-09-04  
[Signature]

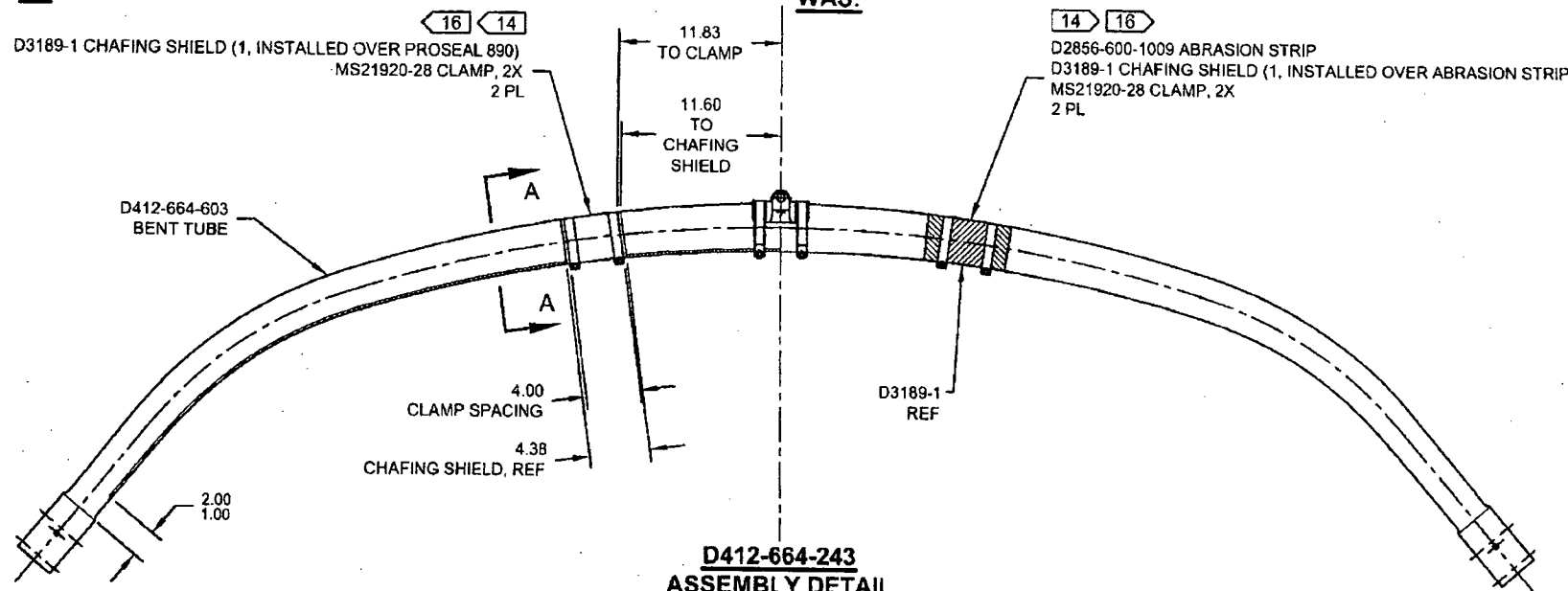
94001

|                             |  |                  |   |                                |                           |              |
|-----------------------------|--|------------------|---|--------------------------------|---------------------------|--------------|
| DRAWING NO.<br>D412-664-243 | TITLE<br>CROSSTUBE ASSEMBLY (412 HI AFT) | REV. E           | DART AEROSPACE LTD<br>ENGINEERING ORDER | D.E.O. NO.<br>D412-664-243-E-4 | SHEET NO.<br>SHEET 2 OF 3 | SCALE<br>NTS |
| DRAWN<br>97                 | CHECKED                                  | MFG. APPR.       | APPROVED                                | DE APPR.                       |                           |              |
| DATE<br>12.08.21            | DATE<br>12.08.27                         | DATE<br>12.08.29 | DATE<br>12.08.29                        | DATE<br>12.08.29               |                           |              |

**IS:**

D3189-1 CHAFING SHIELD (1, INSTALLED OVER PROSEAL 890)  
MS21920-28 CLAMP, 2X  
2 PL

D412-664-603  
BENT TUBE



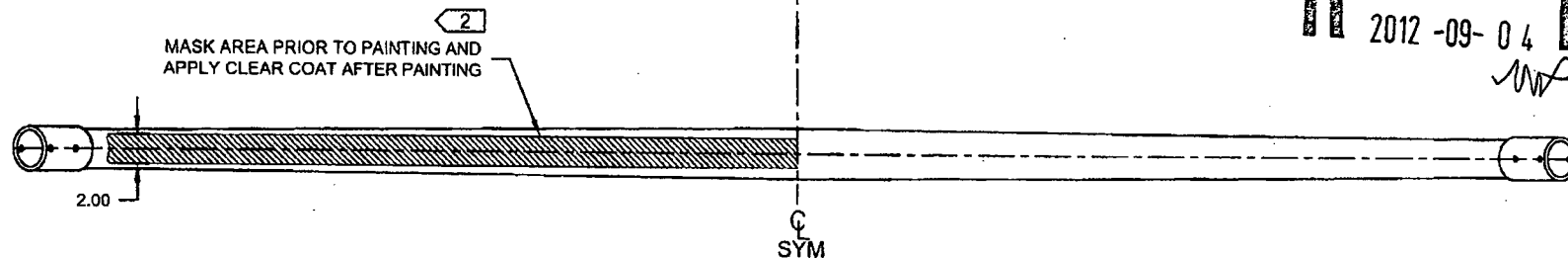
**WAS:**

D2856-600-1009 ABRASION STRIP  
D3189-1 CHAFING SHIELD (1, INSTALLED OVER ABRASION STRIP)  
MS21920-28 CLAMP, 2X  
2 PL

D3189-1  
REF

**D412-664-243  
ASSEMBLY DETAIL**

MASK AREA PRIOR TO PAINTING AND  
APPLY CLEAR COAT AFTER PAINTING

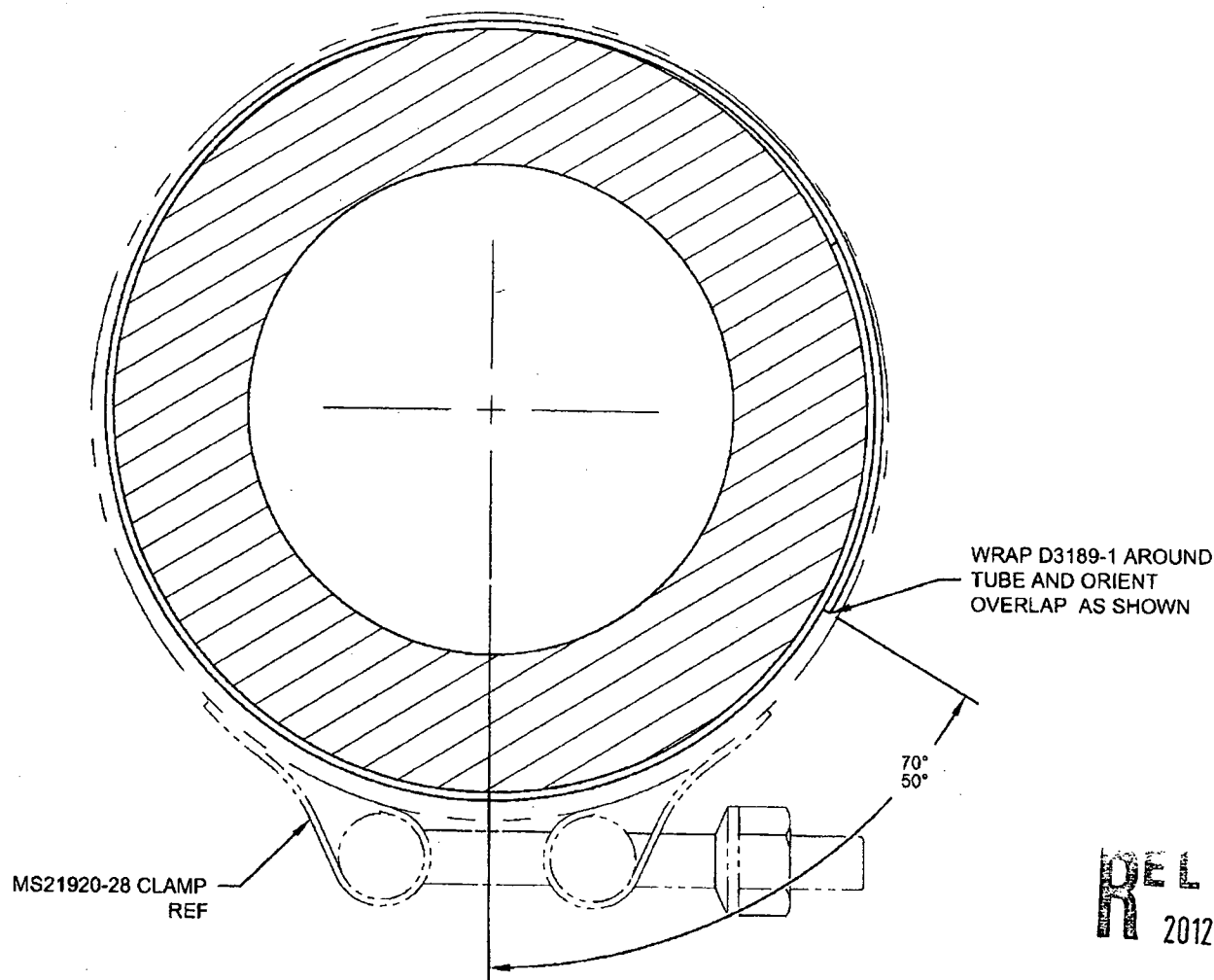


**RELEASED**  
2012-09-04

COPYRIGHT © 2012 BY DART AEROSPACE LTD  
THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS  
NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT  
WRITTEN PERMISSION FROM DART AEROSPACE LTD.

94006

|                             |  |  |  |                      |  |   |  |                                |  |                           |  |              |  |
|-----------------------------|--|--|--|----------------------|--|---|--|--------------------------------|--|---------------------------|--|--------------|--|
| DRAWING NO.<br>D412-664-243 |  | TITLE<br>CROSSTUBE ASSEMBLY (412 HI AFT) |  | REV. E               |  | DART AEROSPACE LTD<br>ENGINEERING ORDER |  | D.E.O. NO.<br>D412-664-243-E-4 |  | SHEET NO.<br>SHEET 3 OF 3 |  | SCALE<br>NTS |  |
| DRAWN <i>q</i>              |  | CHECKED <i>q</i>                         |  | MFG. APPR. <i>MA</i> |  | APPROVED <i>MD</i>                      |  | DE APPR. <i>MD</i>             |  |                           |  |              |  |
| DATE 12.08.21               |  | DATE 12.08.22                            |  | DATE 12.08.29        |  | DATE 12.08.29                           |  | DATE 12.08.29                  |  |                           |  |              |  |



**SECTION A-A**  
CHAFING SHIELD DETAIL  
VIEW ROTATED, NOT TO SCALE

**RELEASED**  
2012-09-04  
*MD*

COPYRIGHT © 2012 BY DART AEROSPACE LTD  
THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS  
NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT  
WRITTEN PERMISSION FROM DART AEROSPACE LTD.



